

ENTOMOLOGY.—*The ant larvae of the myrmicine tribes Melissotarsini, Metapoinini, Myrmicariini, and Cardiocondylini.*¹ GEORGE C. WHEELER and JEANETTE WHEELER, University of North Dakota. (Communicated by C. F. W. Muesebeck.)

The four small tribes treated herein have little in common except that they are all in the formicid subfamily Myrmicinae; that they are all aberrant and highly specialized; and that their affinities are most obscure.

Tribe MELISSOTARSINI Emery

This highly aberrant tribe comprises only six species in two genera—*Melissotarsus* from Africa and Madagascar and the Indomalayan *Rhopalomastix*. Emery (1921/22, p. 8) regarded them as very primitive but very profoundly adapted to particular conditions of existence. According to Wheeler (1929, *Psyche* 36: 100) they are probably the last survivors of some very ancient myrmicine stock.

We find the larva of *Rhopalomastix* to be quite aberrant among the Myrmicinae but not notably specialized.

Genus *Rhopalomastix* Forel

Moderately slender. Diameter nearly uniform throughout, slightly constricted between the first and second abdominal somites. Slightly curved ventrally; dorsal profile evenly convex; ventral profile angulate between the first and second abdominal somites, otherwise nearly straight. Anterior end broadly rounded. Posterior end with a conspicuous dorsal knob projecting posteriorly. Spiracles minute and uniform. Head protruding from the ventral surface near the anterior end. Body hairs of three types: (1) Generally distributed, short, slightly curved, with short-branched tip; (2) very long, flexible, with short-bifid tip, restricted to the lateral surfaces, most numerous on prothorax, diminishing posteriorly; (3) a few minute simple spikes on the ninth and tenth abdominal somites. Cranium quadrate, with the corners rounded; front bulging enormously. Antennae with two sensilla each. Anterior surface of labrum with 10–12 hairs which are as large as those on the head; posterior surface with only a few spinules. Mandibles feebly sclerotized, except the teeth which are heavily sclerotized; proximal medial tooth very stout; no spinules. Maxillae

with the apex short-subconical and directed medially; palp a small low elevation bearing three sensilla; galea consisting of two small contiguous cones, each bearing an apical sensillum. Labium small and hairy. No spinules on the hypopharynx.

Rhopalomastix rothneyi Forel

Figs. 13–20

Moderately slender. Diameter nearly uniform throughout, greatest at the fifth abdominal somite, slightly constricted between the first and second abdominal somites. Slightly curved ventrally; dorsal profile evenly convex; ventral profile angulate between the first and second abdominal somites, otherwise nearly straight. Anterior end broadly rounded. Posterior end with a conspicuous dorsal knob projecting posteriorly; anus posterior, immediately beneath the knob. Ventral surface slightly flattened (but still convex), bordered on each side by a lateral longitudinal welt. Head protruding from the ventral surface near the anterior end. Anterior end formed from the dorsal surface of the prothorax. Leg vestiges present. Spiracles minute. Body hairs moderately numerous. Of three types: (1) Generally distributed, short (0.036–0.072 mm), slightly curved, with a short-branched tip; (2) very long (0.14–0.31 mm), flexible, with short-bifid tip, restricted to the lateral surfaces, most numerous on the prothorax, diminishing posteriorly; (3) a few minute (0.001–0.002 mm) simple spikes on the ninth and tenth abdominal somites. Integument of ventral surface of thorax sparsely spinulose, the spinules rather coarse and usually isolated. Cranium quadrate, a trifle broader than long, the corners rounded; front bulging enormously. Head hairs rather numerous, short (0.018–0.036 mm), stout, with frayed tip. Antennae each with two sensilla, each of which bears a spinule. Labrum small, short, subrectangular, slightly narrowed ventrally; anterior surface with 10–12 hairs which are similar to and as large as head hairs; ventral border with six sensilla and a few isolated spinules; posterior surface with a few spinules and sensilla near the ventral border. Mandibles rather stout; teeth heavily sclerotized, otherwise feebly sclerotized; apex curved medially and forming a slender sharp-pointed tooth; first medial tooth similar to apical, proximal very

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stout; all teeth near the anterior surface and all pointed medially. Maxillae swollen; apex short-subconical and directed medially; spinulose, the spinules minute, stout and isolated; palp a small low elevation with three sensilla, two of which bear each a spinule, the third a conical cap; galea consisting of two small contiguous cones, each bearing an apical sensillum with its spinule. Labium small and hairy; palp small, with three spinule-bearing sensilla, two of which are mounted on subcones; opening of sericteries a very short transverse slit dorsal to the palps. (Material studied: 20 larvae from Singapore.)

Tribe METAPONINI Forel

Genus *Metapone* Forel

When Forel established this genus in 1911 he placed it provisionally in the Ponerinae in a special section which he called Promyrmicinae. "A year later, Emery examined *M. greeni* and its larva more critically and found that alcoholic specimens of the latter when properly softened and expanded had the usual shape of body, head and mouthparts of the Myrmicine larva and were furnished with long, serially arranged, hooked, dorsal hairs unlike any known Ponerine larvae, but like many larval Myrmicinae" (Wheeler, 1919, p. 173). Emery concluded that *Metapone* was a true myrmicine but retained the section Promyrmicinae to include the tribes Metaponini and Pseudomyrmicini. In the *Genera insectorum* (1921/22) he placed it at the beginning of the Myrmicinae. In 1919 (p. 177) Wheeler was convinced that *Metapone* was an "aberrant and highly specialized, though probably ancient genus of Myrmicinae, neither primitive nor ancestral," and placed the tribe "provisionally between Emery's Melissotarsini and his Stereomyrmicini." It is most unfortunate, therefore, that we have no larvae of this genus for study. The published figures and descriptions are inadequate, controversial and inconclusive.

Metapone greeni Forel

Forel (1911, p. 446) in the definition of his new section Promyrmicinae characterized the larvae as "extrêmement sveltes, distinctement articulées, sans tubercules, mais pourvues de longues soies, avec une tête distincte et deux long crocs chitineux ont tout à fait le facies des Ponérines." (Quoted by Emery, 1912, p. 94.) Fig. 7 showed a larva in side view.

Emery, 1912, p. 94:

Je donne ici une esquisse d'une jeune larve de *Metapone* que j'ai fait gonfler dans l'eau distillée, ce qui a fait que la cuticule s'est détachée des muscles, racornis par l'alcool, le contour de la cuticule est passablement différent de la figure de Forel qui, évidemment, a dessiné la larve dans l'alcool, c'est-à-dire ratatinée et maigrie. Dans ma figure, la larve n'est plus extraordinairement allongée et je connais nombre de larves de Myrmicines et de Camponotines qui sont aussi élancées qu'elle. La dite larve a une tête passablement grosse, mais pas plus distincte que d'ordinaire: les crocs qui font saillie dans la figure de la larve contractée par l'alcool, sont grands, mais pas excessivement, dans mon dessin.—J'ai dessiné la tête d'une larve de *Metapone* plus grande (ramollie comme il a été dit plus haut), pour montrer les parties buccales. A mon avis, cette larve n'a guère le facies d'une larve de Ponérine. Dans la larve que j'ai dessinée, les très longues soies sont disposées par rangées transversales, régulières, à la face dorsale de chaque segment et les soies des segments postérieures sont terminées en crochets (poils d'accrochage). C'est un caractère de Myrmicine plutôt que de Ponérine.

Fig. 1, a larva and its head enlarged, both in side view. (See Wheeler below.)

Emery, 1921/22, p. 20: "Larves non hypocéphales."

Wheeler, 1919, p. 173: See above under the genus. Fig. 2 (p. 180) reproduced Emery's (1912) figure.

Tribe MYRMICARIINI Forel

This tribe comprises a single genus of about 15 species. "This extraordinary genus may be recognized at once by the 7-jointed antennae of the worker and female and the unique structure of the abdomen in the male. The species are distributed over the Ethiopian, Indomalayan, and Papuan Regions but do not enter Australia. The majority of the species and the largest are Ethiopian. The large species form crater nests in the soil; some of the smaller, both in Africa and in the Orient, make small carton nests on the under side of leaves" (Wheeler, 1922, Bull. Amer. Mus. Nat. Hist. 45: 141).

Genus *Myrmicaria* Saunders

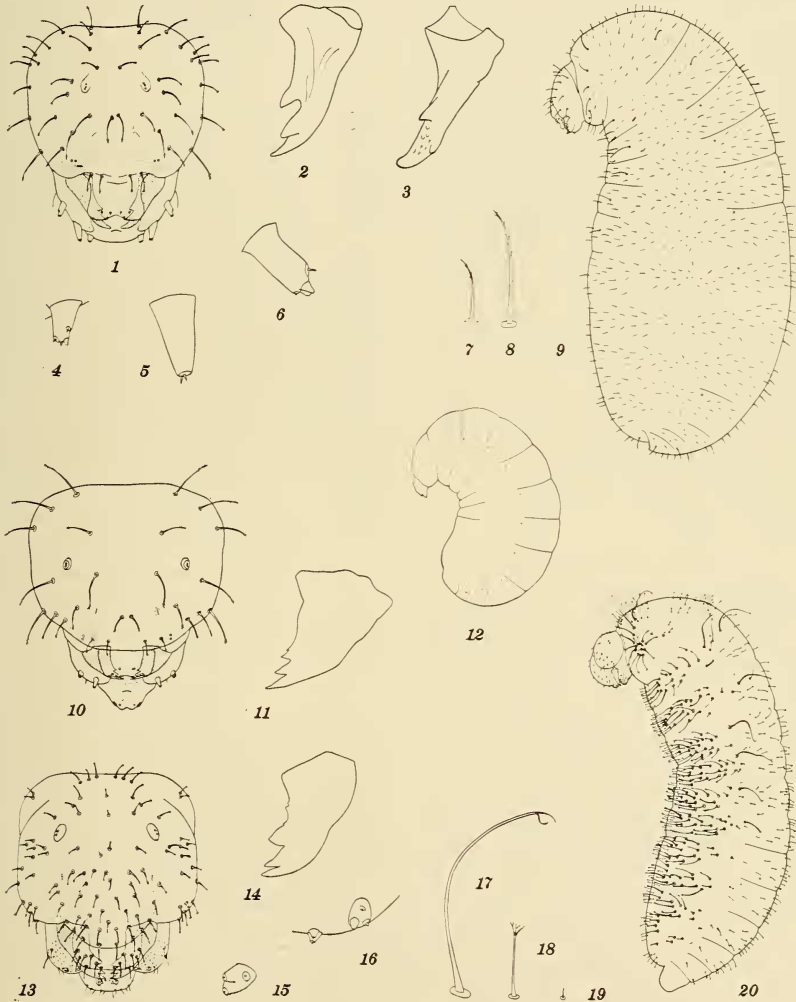
Short and very stout; diameter greatest at the third abdominal somite, decreasing gradually toward the anterior end and more rapidly toward the posterior end which is broadly rounded. Thorax strongly arched ventrally; head on the anterior end but directed posteriorly. Dorsal profile long and C-shaped, ventral much shorter.

Spiracles small and uniform. Mouth parts small. Antennae large and drumlin-shaped. No spinules on the posterior surface of the labrum nor on the mandibles or hypopharynx. Mandibles small and short. Labium narrowed ventrally, with two small ventral knobs.

Myrmicaria eumenoides opaciventris Emery
Figs. 10-12

Short and very stout; diameter greatest at the third abdominal somite, decreasing gradually

toward the anterior end and more rapidly toward the posterior end, which is broadly rounded. Thorax strongly arched ventrally; head on the anterior end but directed posteriorly. Dorsal profile long and C-shaped, ventral much shorter. Anus postero-ventral. Leg and wing vestiges present. Spiracles small. Integument furnished with minute spinules, isolated or in short rows. Head small; cranium subhexagonal in anterior view, slightly narrowed ventrally, a little broader than long. Mouth parts small. Head hairs few,



Figs. 1-9.—*Cardiocondyla elegans uljanini* Emery: 1, Head in anterior view, $\times 95$; 2, left mandible in anterior view, $\times 235$; 3, left mandible in medial view, $\times 235$; 4, left labial palp in anterior view, $\times 340$; 5, left galea in anterior view, $\times 340$; 6, left maxillary palp in anterior view, $\times 340$; 7, 8, two types of body hairs, $\times 235$; 9, larva in side view, $\times 32$.
 Figs. 10-12.—*Myrmicaria eumenoides opaciventris* Emery: 10, Head in anterior view, $\times 56$; 11, left mandible in anterior view, $\times 185$; 12, larva in side view (hairs omitted), $\times 5$.
 Figs. 13-20.—*Rhopalomastix rothneyi* Forel: 13, Head in anterior view, $\times 95$; 14, left mandible in anterior view, $\times 185$; 15, labial palp in anterior view, $\times 371$; 16, ventral portion of left maxilla showing palp and galea, $\times 371$; 17-19, three types of body hairs, $\times 185$; 20, larva in side view, $\times 64$.

short to moderately long (0.075–0.15 mm), stout, with denticulate tip. Antennae large, drumlin-shaped; each has three sensilla, each of which bears a spinule. Labrum small; subtrapezoidal in anterior view, narrowed ventrally; ventral border feebly impressed at the middle; anterior surface with 4–8 sensilla; ventral border with four clusters of 3–4 sensilla each; posterior surface with two clusters of three sensilla each and eight isolated sensilla. Mandibles small, short and subtriangular in anterior view, feebly sclerotized except apical teeth which are moderately sclerotized; apex forming a sharp-pointed tooth which is directed medially; two medial teeth shorter and stouter. Maxillae small, with the apex paraboloidal; palp a frustum with three apical and two subapical sensilla; galea a longer frustum with two apical sensilla. Labium narrowed ventrally, with two small ventral knobs; anterior surface spinulose, the spinules minute and in a few short arcuate rows; palp a low elevation bearing five sensilla; opening of sericteries a short transverse slit.

Sexual larva: Longer and much more voluminous; turgid. Head relatively minute. In other respects similar to worker larva.

Material studied: Eight larvae from the Belgian Congo. Since every specimen has had all or most of its body hairs broken off, we have made no attempt to describe these structures.

Myrmicaria exigua Ern. André

Eidmann, 1944, p. 445: "Die Larven sind mit hakenförmigen langen Haaren (*Oncochaeten*) dicht bedeckt, durch welche sie sich leicht zusammenballen oder auch an den Wänden der Kartonnester fest haften."

Tribe CARDIOCONDYLINI Emery

This tribe consists of two genera. *Xenometa* is known only from the female of a single species from the West Indies. *Cardiocondyla* comprises about 20 species occurring throughout tropical and warm temperate regions; the colonies are small; males are generally apterous and ergatoid.

Genus *Cardiocondyla* Emery

Plump, chunky, and subellipsoidal; head ventral near the anterior end, mounted on a stout but very short neck; ends rounded. Spiracles minute, the first slightly larger. Body hairs of one type; with the distal half denticulate. Head hairs with the tip denticulate. Labrum nearly as

long as broad. Mandibles with the apex forming a rather long tooth which is curved medially and posteriorly; two stout round-pointed medial teeth (the subapical anterior and the proximal posterior) separated by a denticulate cavity. Maxillae with the apex conoidal and directed ventromedially; palp subcylindrical, with five sensilla. Labial palp a short peg, with five sensilla. No spinules on the hypopharynx.

Cardiocondyla elegans uljanini Emery

Figs. 1–9

Plump, chunky, and subellipsoidal; head ventral, near the anterior end, mounted on a stout but very short neck formed from the anterior portion of the prothorax; anterior end broadly rounded and formed from the dorsa of the prothorax and mesothorax; posterior end rounded. Anus terminal. Leg and wing vestiges present. Spiracles minute, the first slightly larger. Integument with a few short to long transverse rows of minute spinules on the ventral surface of the thorax and anterior abdominal somites and a few on the dorsal surface of the posterior abdominal somites. Body hairs short, numerous and uniformly distributed; with the apical half denticulate; most hairs lack alveolus and articular membrane and range in length from 0.045–0.063 mm; a few, however, are longer (0.054–0.09 mm) and have alveolus and articular membrane. Cranium subhexagonal in anterior view, a little broader than long and slightly narrowed ventrally. Head hairs moderately numerous, rather short (0.036–0.072 mm) with the tip denticulate. Antennae small, with three sensilla each; a minute spinule on each sensillum. Labrum nearly as long as broad, slightly narrowed dorsally, bilobed; anterior surface of each lobe with two minute hairs and/or sensilla and a few rows of minute spinules; ventral border of each lobe with one isolated and two contiguous sensilla and several minute spinules; posterior surface of each lobe with one large and three minute sensilla arranged in a sublongitudinal row; posterior surface spinulose, the middle three-fifths of the dorsal half with numerous subtransverse rows of minute spinules, fewer rows elsewhere. Mandibles moderately sclerotized, subtriangular in anterior view; apex forming a rather long tooth which is curved medially and posteriorly; two stout round-pointed medial teeth (the subapical anterior and the proximal posterior) separated by a denticulate cavity. Maxillae with the apex conoidal, directed

ventromedially and sparsely spinulose, the spinules minute and in short rows; palp subcylindrical, with four apical (two with a cap and two with a spinule) and one subapical (with a spinule) sensilla; galea a tall frustum with two apical sensilla, each bearing a spinule. Labium with the anterior surface sparsely spinulose, the spinules exceedingly minute and in short transverse rows; palp a short peg, with four apical (two with a cap and two with a spinule) and one subapical (with a spinule) sensilla; opening of sericteries a short slit on the anterior surface. (Material studied: six larvae from Turkestan.)

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ZOOLOGY.—*Valletofolliculina bicornis*, a unique new genus and species of folliculinid (*Ciliata: Heterotricha*) from California. E. A. ANDREWS, Johns Hopkins University. (Communicated by Edward G. Reinhard.)

Ciliated Protozoa of the family Folliculinidae are found in the Atlantic and Pacific, north and south, living each in its own bottlelike dwelling, theca or test, but each is capable of doing away with its complicated feeding apparatus and assuming a simplified actively swimming phase. This swimming phase is of brief duration and ends in the making of a new dwelling like the former one. These tests are chitinlike and durable and present differences in size, form, and structure used to distinguish species and genera.

Some tests sent me from California represent a new species and genus as having sculpturing unlike that of any known form, of which 68 species and 28 genera are found in the great work of Hadzi (1951). These tests were very abundant on all small bivalve shells dredged April 7, 1951; but at the same place none were found in July; so it is feared these folliculinids may be nomads, as others in the Chesapeake (Andrews, 1950), and not readily found again to furnish the needed information as to how these tests originate. As yet we have only preserved tests and no information about the living animal.

DESCRIPTION

As seen in the photograph (Fig. 1), the tests stand in small groups scattered over all the inner face of bivalve shells except the border, which is

clear as probably being on the ground where the shell lay inside down. Apparently there was access above at the raised umbo into the quiet water area under the shell, so that the folliculinid swimmers went in in conformity with the habit of folliculinids to settle in depressions, cavities, or circumscribed areas. In any group (Fig. 5) it is noteworthy that the tests stand radiating outward from a vague center: often two side by side or at angles to one another, giving the impression that when parking in a group the swimmers had been influenced by each other. Each test (Figs. 2-4) has a very much elongated pear shape, lying attached most of its length as a body with rounded posterior, tapering gradually to a slender neck that rises upward, as seen in side view (Fig. 3). From the narrowest front of the neck suddenly flares out a wide funnellike mouth, suggesting a convolvulus flower. Quite unique is the presence of two ridges, like ramparts, along the right and left edges of the roof of the body of the test. These ridges converge anteriorly to dwindling points but posteriorly to swellings, each of which is produced as a horn that rises upward and outward. The two swellings and horns are generally not opposite, but either the right one or the left one is nearer the hind end of the test. It is to be emphasized that the horns and the ridges are not solid, but hollow, each being a space covered with membrane as is the main dwelling space. Thus there are five separated cavities: the main dwelling cavity, the two of